

* *Sternum moderately broad, with extended sides of the abdominal plates united to the margin by a dentate bony suture. Hinder part of the sternum truncated; anal plates quadrangular. The pectoral plates quadrangular, nearly as broad in the central line as on the outside.*

1. GONIOCHELYS. Sternum truncated in front, without any odd anterior plate; the shields transverse, parallel.

1. *G. carinatum.*

2. AROMOCHELYS. Sternum rounded in front, with a triangular odd front shield; second pair of shields diverging.

1. *A. odoratum.*

** *Sternum broad, attached to the marginal plates by the elongated cartilaginous suture, which becomes more or less bony with age. The hinder part of the sternum entire or slightly truncated and notched in the middle; the anal plates triangular. The anterior and posterior lobes more or less broad and movable on the central portion by a straight mobile suture. The axillary, and especially the inguinal, plates elongate, covering the sternal costal suture. The pectoral plates triangular, very narrow in the central line.*

3. KINOSTERNON. The hinder sternal lobe not so broad as the cavity of the dorsal shell, leaving the legs exposed at all times.

1. *K. pennsylvanicum, &c.*

4. SWANKA. The hinder lobe of the sternum as broad and large as the cavity of the shell, covering the legs when withdrawn.

1. *S. scorpoïdes.*

BIBLIOGRAPHICAL NOTICES.

First, Second, Third, and Fourth Annual Reports on the Geological Survey of Indiana, made during the years 1869-72. By E. T. COX, State Geologist, assisted by MESSRS. BRADLEY, HAYMOND, LEVETTE, COLLETT, HOBBS, and WARDER. In three vols., with two Atlases of Maps. 8vo. Indianapolis, 1869-72.

STEP by step, and indeed with rapid strides, is the geological surveyor examining the North-American States in detail, mapping and recording the physical features, structure, mineral contents, and products of each State, as well as its natural-history characteristics.

Indiana, consisting almost wholly of Carboniferous strata, has its limestones, sandstones, fire-clays, ironstones, and coals in abundance, covered with glacial deposits and alluvium. All of these are being

defined on the maps, and have their characters, relative position, and economic capabilities duly pointed out. For those interested in coal- and iron-works, Prof. Cox's Reports afford much information; and the agriculturist finds instruction in them on many points as to hill-sides, flats, river-banks, &c. The mineral waters and oil of the coal-series, the salt wells and mineral springs, the great caves, especially of Wyandotte, rivalling the "Mammoth Cave" of Kentucky, and the cave-fauna, are among the special objects of interest to geologist and naturalist. The old Indian mounds of Martin and Sullivan Counties are also described. The Meteorology, Botany, and Zoology of certain parts are treated of in detail by various collaborators.

Prof. Cope supplies (1872) a Report on the Wyandotte Cave and its fauna, giving a detailed account of the Cave and its inhabitants, with woodcut illustrations. The following is his list of the species living in the caves, chiefly of Indiana and Kentucky:—

Vertebrata.

- Amblyopsis spelæus, *De Kay*. Mammoth Cave and Wyandotte Cave.
 Typhlichthys subterraneus, *Girard*. M. Cave.

Arachnida.

- Erebomaster flavescens, *Cope*. W. Cave.
 Acanthocheira armata, *Tellk.* M. Cave.
 Phrixis longipes, *Cope*. M. C.
 Anthrobia, sp. W. C.
 ——— mammouthia, *Tellk.* M. C.

Crustacea.

- Orconectes inermis, *Cope*. W. C.
 ——— pellucidus, *Tellk.* M. C.
 Cæcidotea microcephala, *Cope*. W. C.
 ——— stygia, *Pack.* M. C.
 Cauloxenus stygius, *Cope*. W. C.
 Stygobromus vitreus, *Cope*. M. C.

Insecta.

- Anophthalmus tenuis, *Horn.* W. C.
 ——— eremita, *Horn.* W. C.
 ——— Menetriesii, *Motsch.* M. C.
 ——— Tellkampffii, *Erichs.* M. C.
 ——— striatus, *Motsch.* M. C.
 ——— ventricosus, *Motsch.* M. C.
 ——— pusio, *Horn.* Erhart's Cave, Virginia.
 ——— pubescens, *Horn.* Cave-city Cave, Illinois.
 Quedius spelæus, *Horn.* Wyandotte Cave.
 Adelops hirtus, *Tellk.* Mammoth Cave.
 Lestera, sp. W. C.
 Raphidophora, sp. W. C.

- Raphidophora subterranea, *Scudd.* M. C.
 Phora, sp. W. C. and M. C.
 Anthomyia, sp. W. C. and M. C.
 Machilis, sp. W. C. and M. C.
 Campodea, sp. W. C.
 ——— Cookei, *Pack.* M. C.
 Tipulid. W. C.

Myriopoda.

- Spirostrephon cavernarum, *Cope.* W. C.
 Scoterpes Copei (*Pack.*), *Cope.* M. C.

“The mutual relations of this cave-life form an interesting subject [observes Prof. Cope]. In the first place, two of the Beetles, the Crickets, the Centipede, the small Crustaceans (food of the blind Fish) are more or less herbivorous. They furnish food for the Spiders, Crawfish, *Anophthalmus*, and the Fish. The vegetable food supporting them is, in the first place, Fungi, which, in various small forms, grow in damp places in the cave; and they can always be found attached to excrementitious matter dropped by the Bats, Rats, and other animals which extend their range to the outer air. Fungi also grow on the dead bodies of the animals that die in the caves, and are found abundantly on fragments of wood and boards brought in by human agency. The Rats also have brought into fissures and cavities, communicating with the cave, seeds, nuts, and other vegetable matters, from time immemorial, which have furnished food for Insects. The Rats and Bats have, no doubt, had much to do with the continuance of land life in the cave; and the Mammals of the Postpliocene or earlier period, which first wandered and dwelt in its shades, were introducers of a permanent plant life.

“As to the small Crustaceans, little food is necessary to support their small economy; but even that little might be thought to be wanting as we observe the clearness and limpidity of the water in which they dwell. Nevertheless the fact that some cave-waters communicate with outside streams is a sufficient indication of the presence of vegetable life and vegetable débris in variable quantities at different times. Minute freshwater Algæ no doubt occur there, the spores being brought in by external communication; while remains of larger forms, as *Confervæ* &c., would occur plentifully after floods. In the Wyandotte Cave no such connexion is known to exist. Access by water is against the current of small streams which discharge from it.

“On this basis rests an animal life which is limited in extent and must be subject to many vicissitudes. Yet a fuller examination will probably add to the number of species, and of these no doubt a greater or less number of parasites on those already known. The discovery of the little Lernæan [*Cauloxenus stygius*, on the upper lip of *Amblyopsis spelæus*] shows that this strange form of life has resisted all the physiological struggles which a change of light and temperature must have produced; and that it still preys on the food of its host, as its ancestors did, there is no doubt. The blindness of

the Fish has favoured it in the 'struggle for existence,' and enabled it to maintain a position nearer the commissariat with less danger to itself than did its forefathers."

Illustrated Guide to the Fish, Amphibian, Reptilian, and supposed Mammalian Remains of the Northumberland Carboniferous Strata.

By T. P. BARKAS, F.G.S. 8vo, pp. 117; and Atlas of Carboniferous Fossils from the Northumberland Carboniferous Strata, folio, 10 plates. Hutchins: London, 1873.

MR. BARKAS is willing that palæontological students shall fully profit by the rich collection of fossil bones, teeth, and scales which he has obtained both by personal search and by judiciously directing the intelligent observation of working miners in the Newcastle coal-field. With this view he has had nearly 250 figures carefully lithographed, and some chromo-lithographed, of natural size and magnified, in the handsome Atlas of his 'Manual of Coal-measure Palæontology.' These figures comprise several reproduced from other works, for comparison and to make this illustrated series of vertebrate remains from the Northumberland Coal-measures as complete as present circumstances permit. The descriptive portion, evidently from the pen of an amateur, contains abundant references to other publications and frequent acknowledgment of fellow workers. Doubtless Mr. Barkas's good intention of stimulating further research in this highly interesting field of geology will not be fruitless; collectors will see at a glance the natural groups to which their specimens may be referred; and naturalists have here much material before them ready for critical examination, and will find in Mr. Barkas's descriptions many suggestive observations on specimens having doubtful characters.

1. *The Physical Geology and Geography of Great Britain.* By A. C. RAMSAY, LL.D., F.R.S., &c. 3rd Edition. London: Stanford, 1872.

2. *The School Manual of Geology.* By J. B. JUKES, M.A., F.R.S., &c. Second Edition, revised and enlarged; edited by A. J. JUKES-BROWNE. Small 8vo. Edinburgh: Black, 1873.

THESE new editions are to be recommended; for the first is now a standard work on the physical geography of the British Isles and, correlatively, on the geological structure, not only of neighbouring lands, but of all parts of the world; for the same principles rule, and similar results are found, wherever the geologist betakes himself with educated eye and mature judgment. The bold treatment of physical features, on the large scale, by reference to ancient extensive planes of marine denudation and the subsequent long-continued excavation of all valleys by atmospheric, glacial, pluvial, and fluvial action, is a leading idea in Prof. Ramsay's masterly work, and has a powerful and wholesome influence in enlarging the mental views